

THE CHIRONIAN

The Chironian is owned by the Alumni Association of the New York Homeopathic Medical College and Flower Hospital and published by the EXAMINER PUBLISHING HOUSE at 9 North Queen Street, Lancaster, Pa. It is issued monthly as the official journal of the alumni and students and is devoted to the interest of their Alma Mater. Original articles, alumni and undergraduate notes, book reviews and all reading matter of value to The Chironian should be sent to the Editor, E. R. Eaton, Flower Hospital, New York City.

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All subscriptions, advertisements, and other matters of business should be addressed to **Office of Publication at Lancaster, Pa.**, or mailed to Editor, E. R. Eaton, Flower Hospital, New York. All orders for reprints must be in within ten days after publication.

Subscription Price, \$1.00 per Year. Single Copy, 10 Cents.

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THE CHRONIAN

"In Essentials, Unity; In Non-Essentials, Liberty; In All Things, Charity."

VOLUME XXXIII

SEPTEMBER 1916

NUMBER 3

Orthopedics in General Practice.*

BY

ANSON H. BINGHAM, CLASS OF 1900.

THE general practitioner is the first to be consulted about the acquired deformities, and those conditions which result in deformity, so it is of the greatest importance that he should recognize these conditions in their earliest incipency.

A favorable prognosis in an orthopedic case depends upon two factors: early diagnosis and proper treatment; both of which the general practitioner should be prepared to give in the majority of cases. These cases are seen early much oftener by the physician than by the specialists, and, if recognized then, simple treatment will often suffice.

If these cases are recognized in the early stages and properly treated, many deformities which would otherwise develop would be prevented; and we would not then see so many cases which have gone on to the later stages of development. These are much more difficult to treat, and they present these marked deformities only because they were not recognized in the early stages and properly treated.

It is always easier to *prevent* the occurrence of deformity than to correct it after it has become permanent and fixed.

*Read before the Homeopathic Medical Society of the County of New York, June 8, 1916.

The object of this paper is to discuss briefly the early diagnosis and treatment of some of those conditions frequently met with in general practice, which, if not recognized or if left untreated, commonly result in loss of function and deformity.

The family physician is constantly consulted for indefinite aches and pains in the feet and legs, which are often regarded as symptoms of chronic rheumatism, when a careful examination would show a condition of weak foot,—not flat foot, for weak feet should be recognized long before falling of the arch has developed.

If a patient complains of continued discomfort, or more or less constant pain in the feet or ankles, with a negative history of any other joint involvement, it almost invariably points to a condition of weak foot, and a careful examination should be made with this idea in view.

To be of any value, this examination should be made with the patient standing and walking, for while at rest such a foot may appear perfectly normal.

Normally the body weight passes through the center of the knee joint, down the crest of the tibia, through the center of the ankle joint, and across the dorsum of the foot to the second toe. In weak feet this relationship is immediately changed, and the weight distributed to the inner side of the foot, at a point corresponding to the astragale-scapoid articulation.

The earliest sign is eversion outward of the foot accompanied by a wearing away of the sole of the shoe on its inner border. The internal malleolus is very prominent. The patient walks with the toes turned outward. This always denotes a weak foot, even though at this time the arch may appear perfectly normal.

Under normal conditions the inner border of the foot curves somewhat outward; so if the feet are placed side by side, there will be well marked space between them. If, on the other hand, this concavity is replaced by a convexity, so that this space is obliterated, it shows that the feet are weak.

If this condition is allowed to continue untreated, it is only a question of time before the arch gradually gives way, followed by flat foot as a final result. This could easily have been prevented by recognizing those early symptoms and applying proper treatment at this time.

In successfully treating a condition of weak foot, we must aim to accomplish two things: first, to correct the eversion, and secondly, to restore strength to the weakened muscles and ligaments.

The first object can be accomplished by building up the heel and sole of the shoe along the inner border for from one-eighth to one-quarter of an inch. This corrects the eversion, transfers the weight of the body to the outer border of the foot, and in the milder cases will be found all that is necessary in the way of treatment, provided the shoe chosen is built on proper lines.

In older cases the same result can be best obtained by extending the heel forward and inward, so that it gives secure support as far forward as the astragale-scaphoid joint. This offers an irresistible obstacle to eversion.

There is always associated in the minds of both the laity and the profession, in connection with the treatment of all foot troubles, the question of arch supports, and few patients come to the orthopedist who have not worn, at least, one variety of the many to be found on the market.

This general tendency to send the patient to a shoe store or instrument maker with instructions to buy and wear a pair of plates cannot be too strongly condemned. We agree with Ogilyy and others that the employment of any arch support is detrimental to the welfare of such feet, unless the eversion which is always present is first corrected.

When for any reason the patient cannot be taught to stand and walk properly, a correctly constructed plate may be applied and worn with great profit for a few months.

An effective plate can only be made from a plaster model of the patient's foot, and must be made to provide lateral support while the foot is performing its function of weight bearing.

The object of exercises is to strengthen the muscles and ligaments of the foot. In most cases athletic sports and active games will do all the exercising necessary. They should be encouraged.

There are three exercises which have proved to be useful in all cases:

(1) With the feet pointed directly forward the patient slowly raises himself on his toes, and slowly returns to the heels.

(2) Walking about the room on the outer borders of the feet.

(3) Trying to pick up objects from the floor with the toes.

When resting, patients with a tendency to abduction and inversion should cross their legs in such a way that the feet will rest upon their outer borders. This will rest all the foot structures and be of inestimable value in preventing deformity.

A patient consults you for the following symptoms: A severe pain, neuralgic in character, located at the second metatarso-phalangeal joint, coming on suddenly while walking, necessitating removal of the shoe and rubbing of the foot, which relieves the pain at once. The shoe is replaced and the patient walks with perfect comfort, when, later on, perhaps, after several days, the same symptoms recur.

An examination shows a breaking down of the transverse arch of the fore-foot with resulting strain of the ligaments and tissues. This is a very common condition, and is often treated as rheumatism or neuritis. The simplest treatment, which is always available and invariably gives relief, consists of strapping a small felt pad beneath the heads of the metatarsal bones. This lifts them up, restores the transverse arch, and disposes of the trouble at once.

You are frequently consulted by parents whose child has a tendency to toe in. The natural position is that in which the feet are directed straight forward, with a slight inclination to intoeing. This is the position of strength, and denotes a strong foot and ankle. So a mild case of pigeon toe requires no attention.

In exceptional cases the sole of the shoe may be slightly raised on its *outer* border, which will correct the attitude if combined with instruction and training.

Children are often brought to you who present a mild case of antero-posterior deformity, or round shoulders, and, if the importance of early treatment in these cases could be appreciated, we would not see so many cases of rotary lateral curvature which are constantly being referred to us.

These children lack muscular tone. They are the ones whom you see lagging behind in their play, tiring easily and hanging back when any active exercise is going on. They run and walk

awkwardly. When standing the shoulders are rounded, the abdomen protuberant, the chest retracted. They often complain of a tired feeling in the back. The appetite is poor and often capricious, they are pale and languid and present a perfect picture of general debility.

In the majority of cases no further examination is made. A tonic is prescribed and the child allowed to leave the office.

If the clothing is removed and the child stood before the examiner, he should recognize at a glance the abnormal posture and be prepared to take active steps to correct this faulty tendency.

At this time the position is entirely due to habit, and can be voluntarily corrected by the patient. This condition can be cured absolutely by properly directed breathing exercises, light calisthenics and proper diet and hygiene.

Our reason for emphasizing early diagnosis and treatment in these cases is as follows:—

If the condition is not recognized, or if proper treatment is not advised and carried out, we see in such cases a slight lateral curvature of the spine which slowly increases, resulting in a well developed case of rotary lateral curvature. So we see how important it is to prevent such a sequence of events.

The first and most important preventive measure is the discovery of deformity, or the tendency to deformity, at a time when it may be checked or cured.

To discover deformity at this period of its development one must look for it. So the regular inspection of the naked bodies of the children under his care should become the routine practice of the family physician.

It is remarkable how quickly these cases improve under proper treatment and how easy it is to prevent the development of a structural deformity.

It is important that the child be daily exercised in standing, sitting and walking properly under the direction of a competent attendant until he begins to assume these attitudes naturally.

Light dumb bells afford one of the best methods of exercise and encourage the systematic cultivation of all the muscles of the body. For developing the special muscles of the back, the postural exercises will be found of value. It is impossible to

enumerate all the exercises which may be used in treating this condition. They may be found in any good text book on orthopedics or gymnastics, and from these we can select the ones best adapted for our case.

We have found it convenient to have these directions printed in the form of a pamphlet, which is given to the parents as a guide. The exercises best indicated are checked off, and the child is shown in the office how to perform them properly.

The importance of improving the general condition of the patient by regulation of diet, cold baths, and active exercise in the open air is self-evident. The strain upon the back should be lessened by providing proper chairs and seats, by limiting the time passed in passive attitude, and by lessening as far as possible the restraint of the clothing. These precautions are of almost equal importance with the active treatment.

There are three common diseases of childhood frequently met with which if not recognized or if left untreated must inevitably result in deformity. These are rickets, poliomyelitis and tubercular joint disease.

There is no condition of childhood which responds to general treatment more quickly than rickets. If left untreated it generally runs its course, and, after a more or less marked degree of bony deformity has occurred, this process of bone softening is spontaneously arrested and the bones harden in their deformed position.

It is a popular idea that bow-legs, knock knee and anterior curvature of the tibia are the result of the child's standing and walking too early; but this is not the case, for, unless the child is rachitic, the bones will be sufficiently strong to stand the weight of the body without bending, and, even if other symptoms are absent, the bending of the bones in a child of this age is sufficient evidence of the presence of rickets.

These deformities can only occur in a child whose bones have been softened by rickets. They can be prevented if the disease is recognized in its early stages and properly treated.

Poliomyelitis is seldom recognized in the early stages, and it is practically impossible to establish a diagnosis until the paralysis appears.

Without treatment of any kind the resulting paralysis will

generally improve for a period of six months, after which it remains permanent or improves very slowly. After a time atrophy, contractions, relaxations and malpositions lead to crippling deformities, which locomotion rapidly increases.

When the acute symptoms have subsided, the family physician should realize that at this stage nearly all the resulting deformities may be prevented by proper splinting and support in order to relax and protect stretched muscles.

The nutrition of the parts may be improved by massage, by muscle beating, by the direct application of heat to the extremities, and by the use of the Faradic and galvanic currents. Dry heat and rubbing are important, and anything which stimulates the circulation helps nourish the muscles.

Beginning at an early period it requires very slight mechanical support to keep the limbs in their normal position.

While the child is in bed he should be placed upon pillows and supported by pillows, sand bags, etc., in such a way as to avoid any undue tension and stretching upon the paralyzed muscles and relaxed ligaments. The feet should always be kept at right angles to the legs to prevent foot drop, the weight of the bed clothing being taken off the toes by a bed hoop or other device.

If the paralysis is very extensive, deformity may best be prevented by placing the child upon a frame or cuirasse. This secures perfect rest to the paralyzed parts and enables the child to be carried about. Each joint should be moved to the limit of the range of motion several times a day, to prevent contractures.

A child recovering from infantile spinal paralysis should not be permitted to be up and about until the paralyzed part is protected by a well fitting brace, as the functional use of such a limb without support must result in deformity.

If the child is brought for treatment after the development of deformity, it must be corrected by tenotomies, stretchings, proper braces and operative measures, which do not come within the province of this paper. But the ability to prevent these distortions rests with the family physician, who assumes charge of the case in the early stages of the disease.

In closing we wish to make a strong plea for the early diagnosis of the tubercular joint diseases. Every child who limps or complains of a more or less persistent pain should in every

case be examined for a beginning joint or spinal inflammation. A great many of these cases with which we come into contact have been treated for rheumatism, growing pains or an acute injury, and the case has progressed so far that extreme destruction of the tissues has taken place. Not infrequently the case has reached the stage of abscess formation before a diagnosis is made and proper treatment applied. Our success in treating these cases is in direct proportion to the stage which is present when the child is referred for treatment. For if we can begin proper treatment in the early stages, we may expect not only to shorten the course of the disease, but to provide the child with a useful limb, with the minimum amount of deformity.

Remedies for Unusual Conditions

BY

B. G. CLARK, M. D.,

Physician to the Hahnemann Hospital, New York City.

A YEAR before I took any medical lectures I met a woman, age about 35, who was suffering from onychia, and had been for six years. This condition had followed scarlet fever. Every six months, first, one finger would begin to be inflamed around the matrix of the nail, then another, until all her fingers and thumbs were affected, were very painful and especially sore to touch. All the nails would be exfoliated, and when they came back were rough and poorly developed. This process was repeated every six months. I told her I thought Homeopathy could cure her; she said she would like to be cured, but had given it up after consulting the best dermatologists in this country and several in Europe. I thought, perhaps, if I had known more about it, I would not have been so certain about curing her. But I went at it, took the case as well as I could, asked all my medical friends for a remedy and studied them up; but none of them seemed to fit.

At last I found in "Gilchrist's Surgical Diseases" (now out of print), among other remedies for onychia, Arnica, which seemed to me to be the remedy, and, after two weeks of study and comparison during the spare time I had, I gave her Arnica 3, three times a day for two months; then Sac lac. The next six months only one finger was slightly inflamed, and none of the nails was thrown off; in fact, they had become normal in appearance, less corrugated. The second six months none of them was at all inflamed, and the fingers were quite normal.

I have seen only three cases since (now 40 years) and Arnica 200 has promptly cured them.

CASE 2.—Parlor maid said when the lady gave her orders for the day she had forgotten it all by eleven o'clock and was about to lose her situation in consequence. Said she could not remember anything but a short time. She also complained of a dull

pain with a feeling of pressure back of both ears,—mastoid region. This pain was constant. There was no soreness on pressure, no history of ear trouble. *R.* Carbolic acid 1000, three powders were given, one to be taken each night. She returned to her work in a week in good health.

CASE 3.—Mrs. W., 55, a very energetic woman, complained of forgetfulness; was unable to carry on her activities in life. Pain over both mastoid regions, with chilliness and lassitude. *R.* Carbolic acid 1000, three powders, one each night and Sac lac. every two hours. She was quite herself in a week. These cases occurred about fifteen years apart. The remedy was found in Hering's Guiding Symptoms.

CASE 4.—Boy, 12, bronchitis. As he was recovering under Sulph., he developed a chill every other day about eleven o'clock; chill commenced in back and went down; chill followed by high fever; sweat, light; tongue clean; was irritable before and after the chill, and was frequently rubbing his nose, but especially during the chill. *R.* Cina 3d was given during the interval. Of the next three paroxysms, each was lighter than the preceding one and these were the last he had.

CASE 5.—Mrs. E. fell while out walking and struck on right side of face; some soreness and slight swelling followed, but was soon over. About four weeks later she began to have pain at the seat of the injury and has suffered from it ever since (now four years). Pain is of a jerking character, with aching in articulation of jaw. Pain renewed by sudden emotion, surprise or worry, and by eating. Better by cold applications. *R.* Hypericum 200 cured her in the course of two weeks.

CASE 6.—Colored girl, 7, ill with diphtheria, nose, pharynx and larynx involved; difficult respiration. The discharge from the nose was thin, excoriating; lip and nose were sore, raw. Temperature 103. Very restless; must have a glass of water handy which she would reach for and take a sip of every minute and a half. The case seemed to call for *Arum triphil.*, but the *Arum triphil.* throat is < by a swallow of water, and I found that it was *Puls.*, whose discharges are, in the acute stage, similar to *Arum triphil.*, but are relieved by a sip of water. *R.* *Puls.* 30 was given, and with marked relief in two hours, the case soon cleared up.

The discharges of *Puls.* are thick and bland according to

most of our observations, and they always are in the second stages of a coryza when we most frequently see them, but it has the thin excoriating discharge in its acute stage, and the backache has nothing to equal it except the backache of small-pox. If any thirst, it calls for a little and often.

CASE 7.—John L., 24. Helper for a bricklayer, had rheumatism in r. hand and arm for three weeks when I was called to see him. Temperature, 102; arm and hand swollen red; least movement was very painful. Pain accompanied by a profuse sweat, not sticky like *Mercurius*; not hot like *Opium*. I prescribed *Sac. lac.*, and on looking for the remedy I found, under *Tilia Europia*, the symptom, "Sweat increases as pain increases." In a study of the remedy, I concluded it was indicated and gave the 30th. He was back at work in a week. I have used it several times since with good results. The hemorrhages calling for *Tilia* are almost colorless. It is also a useful remedy when the maxillary antrum is involved.

CASE 8.—Mr. V., 68. Sciatica, right side. I had prescribed *Rhus* for him, but on my next visit he was no better. He said, "You know, when I get that damn pain, it makes me sweat like h——." R. *Tilia* 30 brought him quick relief. Pain is always relieved on first moving. Muscular weakness of eyes. Urticaria also often call for *Tilia*.

SOME UNUSUAL ACONITE CASES.

CASE 9.—During my early practice, a young woman came to me with her mother, complaining of nausea and vomiting,—worse in the early morning. The history of the case also revealed the fact that she had not menstruated for the past three months. These facts brought to my mind an incident that happened at one of our lectures on Obstetrics, namely: The Professor of Anatomy had sent to the Professor of Obstetrics a mole that one of his patients had passed, and to help emphasize the necessity of a diagnosis, he enclosed a few lines that run thusly:

"When a girl denies with downcast air
That she has missed three months to be *regulair*,
Place your ear down near the hair
And listen, brother, list with care,
List for the 'bruit placentair.'"

On examination, I concluded the girl was pregnant and so informed the mother. The father of the expected baby had left town for some place and had not left his address.

In due time the child was born and all went well until the tenth day, when the girl's father, who had been getting madder every day, concluded, as he could not get the man who had left town, it was the girl's fault anyway. So he took his whip and went into her room, where the atmosphere was blue, and, but for other members of the family, I reckon the girl would have felt the whip. The next morning I was called and found the fright had suppressed the flow, and the patient had a temperature of 104. She was very ill. I called the old man into my office, as I saw him passing, and told him how sick his daughter was and that he was the cause of it; that while she had sinned, she was not half the sinner he had been and if he did not get busy and help his wife care for her I would make it so hot for him that some other town would suit him better. He went home and helped the best he could. The patient was very sick. During the next six weeks I opened four abscesses on each arm and leg. She had a bed sore on her back as large as my hand. I had had council and had done my best in treating the *condition*. I was also taking some journals that spoke of a better Homeopathy, where the *patient* and not the *condition* was the subject for treatment.

Things were looking desperate and I got wide awake and "took the case" as best I could. Temperature, 103½; pulse, 130, and, of course, not very strong. Restless; very thirsty, with frequent chilliness; suffered much anxiety. Aconite 3 was given, and in 24 hours there was decided improvement; temperature, 102, and her general condition decidedly better. Improvement continued and in 4 days temperature was nearly normal, when Hep. and Sulph. at different stages completed the cure, much to my relief. It also helped to put me on the road to better homeopathy. Dr. Armour had lectured to me about the "full bounding pulse of plethora" when Aconite was useful, and Hughes' Pharmacodynamics had again emphasized the *condition* that called for Aconite, but Homeopathy teaches us that it is the patient, and the *law* must be observed. Hence, any remedy, when indicated, will do all it is capable of doing and help the vital force

to restore health. As I looked back and notice the fright the patient suffered, with the high temperature and suppressed flow, I believe that Aconite would have helped her then and saved her much suffering and me much anxiety.

CASE 10.—When Dr. Blodgett, of Boston, told us a few years ago that acetone in the urine (especially of pregnant women) was the cause of the nausea and vomiting, and that Bicarbonate of Soda was the remedy to relieve it, I wondered how it was that we had been able to relieve most of our cases with the homeopathic remedy even if we did not know that acetone was present, so that the next case I had I found the acetone there and also the vomiting; no elevation of temperature, but anxiety, thirst, restlessness, was sufficient for me to prescribe Aconite 30, which relieved the nausea and vomiting, and 8 days later an examination of the urine did not show any acetone present. I believe *the* remedy will relieve any pathological end products in disease that admit of a cure.

CASE 11.—A maid of one of my neighbor's called a few months ago with a history of painful menstruation, but for the last year it was accompanied with nausea and vomiting the first day. Now she was very anxious for fear she was pregnant, as she had had intercourse with a man some three months ago, whom she then expected to marry. It was nearly time for her period now, but she was so afraid something was wrong she had been to her spiritual adviser, who had advised her to see a physician.

I examined her, but found no evidence of pregnancy. Uterus was somewhat retroverted, but otherwise normal. Anxiety; thirst; restlessness; fear, were the general symptoms that call for Aconite, which was given in the 30th potency. I told her she was not pregnant in my opinion, but I would be more positive after her next menstruation, which occurred two weeks later, without much pain and no nausea or vomiting. Examination showed uterus in same position as before, which confirmed my opinion that it was the remedy that had given relief.

CASE 12.—Mrs. H., age 65. Whenever she got angry she always had indigestion, which caused some distress in stomach; but this time she became very nervous about herself; was afraid something was growing inside, etc., was getting very worried. Some nausea; had vomited a little; was very thirsty. Aconite 3 gave her relief and quieted her fears.

CASE 13.—Geo. P., colored, age 32; Chauffeur. Pneumonia L. side. Six weeks later still in the hospital. A rib was resected and considerable pus¹ discharged. Four months later he was brought to me with the pus still discharging from the opening. I sent him over to the Flower Hospital to the surgical clinic, thinking the opening ought to be enlarged, and asked Dr. Kauffman to examine him. X-ray picture showed the lower part of the lung collapsed; injection into the cavity caused cough and he expectorated the fluid injected, which showed the abscess had been in the lung. It was discharging about an ounce of pus daily and he was coughing up some of the same material. No T. B. was found.

I had him removed where I could attend him, as he was a medical and not a surgical case. The man had lost some 30 pounds; tongue white; some thirst; temperature, $99\frac{1}{2}$; not chilly; was feeling better when in the open air, which decided me to give Calc. sulph. 3x instead of Hepar. The discharge was all stopped in 4 days; external opening had healed over; no cough; temperature normal. The patient was up and about and in two weeks returned to his situation. Has continued to improve in general health since, now two months.

May 1st. X-ray at this date shows much more of the lung tissue doing good work.

Now since, when cure is effected through the removal of the whole range of the perceptible signs and symptoms, the inward change which caused the symptoms is also removed (that is, the totality of the disease), it follows that the physician has only to clear away the entire symptom-complex in order also to get rid of the inward alteration—in other words, to remove the whole disease, the disease itself, a feat which must always be the only aim of the rational healer; for the essence of the art of medicine consists in compassing the restoration of health, not in searching for the change in the inward and hidden things, a quest which can tend to nothing but fruitless speculation.—*Organon of the Rational Art of Healing.*

The Chironian

The monthly Journal of the Alumni Association of the New York Homeopathic Medical College and Flower Hospital.

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Examiner Publishing Company, Lancaster, Pa.

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EDITORIAL

THE readers of THE CHIRONIAN will doubtless wonder why this number is not the published Alumni Directory promised in previous numbers. The fact is, that because of the impossibility of bringing the Committee together, due to the vacation season, the Directory is not ready for publication. Dr. House, with his characteristic energy, endeavored to complete the material at hand in order to have it published as advertised, but even this effort failed to materialize the Directory. The CHIRONIAN management therefore decided that it would give our readers the September number, now in hand. In this the Committee proves just two things: first, its purpose not to disappoint our readers and, secondly, an unspoken argument for its own efficiency. With a wealth of good papers and articles in its storehouse the CHIRONIAN Committee can, without difficulty, keep the monthly magazine of our Alumni Association up to date.

Who can say that THE CHIRONIAN is not a thoroughly live and on time medical journal? Next month we hope to have the Alumni Directory ready for all who are interested in its appearance in THE CHIRONIAN.

IN this issue will be found several papers which are valuable and interesting from many points of view. They are the product of men of our own College under the capable and genial leadership of Dr. Fobes. Other people's will follow in subsequent numbers of THE CHIRONIAN.

A natural chronic disease present in the body resists the appearance of a new chronic disease, unless at least the later be a miasmatic or endemic disorder and the body remain unduly exposed to it over a considerable period of time. In such a case, as usually the two diseases are dissimilar, the latter cannot extinguish the earlier homeopathically, and either the former, if it is a weaker disease, is suspended as long as the latter endures (as Schoepf saw an itching skin eruption disappear when the patient was attacked by scurvy, to return, however, after the scurvy was cured), or the two disorders combine into one so-called complicated disease; which, though complicated, always presents a single disease-picture, intermediate between the disease-pictures of the two disorders, and can be treated and cured homeopathically by the totality of the newly united symptom-complexes just like a simple disease. From the time of the second infection up to the time of the combination of both into a third single but complicated disease, the first infection is latent.

—*Organon of the Rational Art of Healing.*

A Clinical Case of Pre-Eclamptic Toxaemia

BY

WILLIAM DE FORREST VOORHEES, CLASS OF 1914.

IN the presentation of this case, it is not my idea to add anything new to the literature on pre-eclamptic toxæmia and its treatment, but, rather, to give a review of the treatment as applied to a case in actual practice. It seems to me that one of the features of this particular case is to prove that our regular routine measures are by no means as infallible as text books would have us suppose.

Mrs. M. first brought herself to my attention on the 19th of April when she consulted me regarding a pregnancy which she expected to terminate about the 20th of August. The patient was twenty-four years of age, a primipara, and had a negative family history. Her menstruation began at the age of fifteen and was irregular in character, lasting about four days and was never profuse. Her previous personal history was negative except for the fact that she had had typhoid last September. With that exception, she was always in good health. Since the inception of pregnancy she had felt very well except for slight nausea at times during the first several months. Physical examination proved her heart and lungs and abdominal viscera to be normal; her pelvis was of ample size and vaginal examination also proved normal. The foetal heart was plainly audible in the left lower quadrant. Urinary examination proved negative. After being given the usual directions, the patient was told to bring a specimen of urine each month, and every other week during the last month.

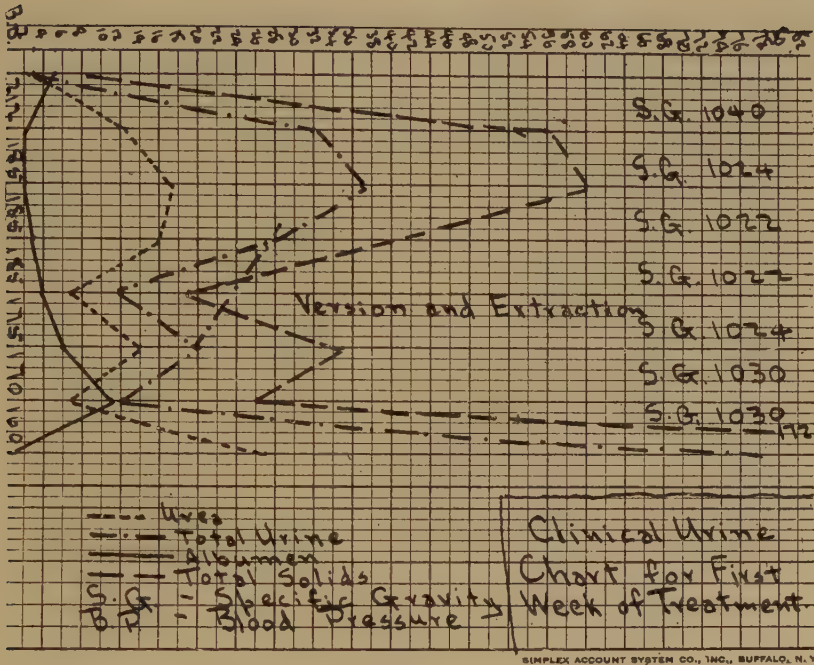
On June 28th the patient consulted me regarding a pronounced swelling of her feet and ankles. Suspecting kidney involvement, I immediately examined a specimen of urine which proved to be negative. A second physical examination proved the heart and lungs to be normal and the uterus of normal size for the period of pregnancy. Tincture of Apocynum was prescribed and a belt advised, which would tend to lift the uterus out of the pelvis and lessen the pressure upon the pelvic veins.

On July 13th the patient asked me to call upon her, saying that the medicine had not improved her condition and that she seemed to be worse. Later in the day when I saw her, I found that her feet were so swollen that she was unable to get around and, in addition, her face had become markedly œdematous—a condition which she herself had not noticed. She had saved her urinary output for the preceding twenty-four hours, which proved to be only three ounces. She had had no headaches, palpitation, or other complaints. Upon boiling the urine, it almost coagulated in the test tube. The patient was at once ordered to go to the hospital.

Upon arrival at the hospital, her blood pressure was taken and found to be 212. Twenty minute hot packs were ordered every three hours and Magnesium sulphate given in a half ounce dose. Ten grains of Theobromine Sodio-Salicylate was given every four hours as a diuretic. The patient was placed upon a milk diet and given plenty of water by mouth. An enema was given and this was followed by a Murphy drip containing Sodium chlorid, 10 g.; Sodium carbonate, 14 g., and water, 1000 c.c. Five hundred cubic centimeters of this was given twice a day conforming with Fischer's method of treatment.

With consultation, it was decided to empty the uterus at once; and a rectal tube was inserted between the uterine wall and the membranes for a distance of eight inches and the vagina then packed tightly. This and the subsequent operations were done under Nitrous oxid—Oxygen anesthesia. This was particularly chosen owing to its easy induction, prompt elimination, and absence of deleterious effects upon the viscera.

Our treatment brought about a marked increase of urine and a drop in the total albumen as is shown by the *appended chart*. In addition, the blood pressure dropped to 185. The free perspiration produced weakness, so the hot packs were given only every six hours. The œdema lessened, but by no means cleared up. The hot packs were given in a somewhat novel way. Instead of the laborious ringing out of hot blankets, the patient was surrounded by ten or fifteen hot water bags and then covered over with blankets. This method, I think, produces the maximum of efficiency with the least discomfort to the patient. In addition, the patient slept between woolen blankets.



At the end of twenty-four hours there was no sign of the onset of labor so the vaginal packing and rectal tube were removed. Examination showed no further cervical dilatation, so a medium sized Voorhees bag was inserted and the vagina again packed. The bag was inserted externally to the membranes in the hope of minimizing the danger of infection.

For another twenty-four hours I waited without a sign of beginning labor pains. At the end of this period the bag was removed and a rectal tube and three bougies inserted as far as they would go and the vagina again packed. In addition, ten grains of Quinine sulphate were given and four doses of Pituitrin—four minims to a dose, at one hour intervals. Before the vagina was packed, the membranes were ruptured. The patient was developing an intense toxæmic headache, the total amount of urine was diminishing and the total excretion of albumen for the twenty-four hour period was beginning to rapidly increase.

Peculiarly, with all this physical interference and medical

aid I was unable to induce labor. The patient began to have sinking spells, and convulsions seemed imminent. Cæsarean section was, of course, out of the question at this late date, due to the intrauterine interference; so an immediate extraction was deemed wise.

The patient was removed to the delivery room and surgical anæsthesia induced with ether. The vaginal packing, bougies, and rectal tube were removed. Examination showed about two fingers' dilatation with a well softened cervix, but very little thinned. Manual dilatation by the Harris method was at once performed, followed by a version and subsequent extraction. The foetal heart sounds had been inaudible for two days previously, and the mother had been warned that there was little or no chance of obtaining a live baby. A dead foetus proved the correctness of our observations. The placenta was adherent and impossible to Crede out, so after carefully changing gloves and re-sterilizing my hands, this was removed manually. A second degree perineal laceration was also repaired at this time with a continuous chromic catgut No. 2 suture, repairing the torn levator muscle, followed by three external silk worm sutures. The patient left the table in excellent condition considering the strenuous procedures to which she had been subjected.

Upon the return of the patient to bed, five drops of Tincture of Echinacea were ordered every three hours, and all former orders regarding hot packs, etc., were discontinued. In addition, the head of the bed was elevated to facilitate drainage. Morphine sulphate, gr. $\frac{1}{6}$, with Atropine sulphate, gr. $\frac{1}{120}$, were ordered to combat the post-operative shock. One-half a cubic centimeter of Van Cott's Mixed Vaccines were also given to combat a possible infection.

During the following twenty-four hours the albumen excretion reached its maximum—11 grammes per liter—filling the Esbach albuminometer more than half. But following this the total excretion of urine went up to 78 ounces and within a day the albumen dropped to half a gramme per liter. From this time on, there was a rapid improvement. The blood pressure dropped to 160 and the œdema cleared up entirely within three days.

During convalescence, the patient was troubled greatly with

gas. For five or six days I tried all routine measures that I knew of, including the insertion of a rectal tip, Essence of Peppermint, Hoffman's Anodyne, Raphanus, soap-sud enemata, alum enemata, turpentine enemata, and injections of Pituitrin. All seemed to be of only temporary relief. At last I ordered two injections of Eserine salicylate, gr. 1/50, with almost immediate permanent relief. Its effect was truly wonderful even though I had previously used the drug in other cases with no result.

A study of the urinary chart is of some interest, and with it I would like to be able to present a study of the urea in the blood, but the necessary apparatus was not at hand for me to work out these tests. In the first place, it shows that the urea excretion kept fairly good pace with the excretion of total urine. In addition, it shows that the output of albumen was influenced in no way by the total excretion of urine or urea. I feel that the chart shows that, in this particular case at least, diuretic drugs were of some value in bringing up the total urea excretion.

Microscopically, the urine was of interest inasmuch at no time were pus cells present, nor were there but a very few scattered granular casts—no more than might be expected from the excretion of any toxic substance tending to cause a degeneration of the kidney epithelia. The absence of any disease of the kidney, as shown both by the urinary examinations before the onset of the eclampsia, and even during eclampsia, seems to show that this particular case was probably etiologically directly related to a failure of the liver to oxidize the toxic products. Upon discharge of the patient, the urine proved to be negative both as to sugar and albumin, and microscopically as to nephritis.

Mrs. M. made an uneventful recovery and was discharged from the hospital 24 days after admission.

Inasmuch, then, as in disease nothing that expresses the need for assistance can be discovered by observation except the complex of symptoms, it follows that it is precisely the totality of the perceptible symptoms, and that alone, which must afford the significant indication in disease for the selection of a remedy.—*Organon of the Rational Art of Healing.*

Anatomy of the Spleen*

BY

JOSEPH KOTIN, CLASS OF 1917.

SINCE the spleen is generally considered as a lymphatic organ, and since recent researches have shown that its structure is quite comparable to that of the lymph glands, it seems advisable to consider it under the head of lymphatic organs.

Its ultimate origin is not yet settled and the details of its later development are still obscure. Its structure differs from that of the lymph glands, chiefly in that it possesses no distinct lymphatic sinuses, but it does possess lymph follicles, splenic corpuscles, densely cellular cords and pulp cords, which are separated by cavernous blood vessels. For some time the spleen was considered as a derivative primarily of the mesenchyme in region of dorsal mesogastrium. More recently, however, investigators have taken the view that it arises partly or possibly entirely from the mesothelium of the dorsal mesogastrium. In human embryos, during 5th week, the analogue of the spleen appears as an elevation on the left side of the mesogastrium. This elevation is produced by local thickening and vascularization of the mesenchyme, accompanied by a thickening of the mesothelium, which covers it. Cells from the mesothelium then migrate into the subjacent mesenchyme and the latter much more cellular. The migration is brief, and, in embryos of about 42 days, has ceased, and the mesothelium is again reduced to a single layer of cells. The elevation becomes larger and projects into the body cavity. At first it is attached to the mesentery and mesogastrium by a broad thick base, but as development proceeds the attachment becomes relatively small and finally forms only a narrow band of tissue through which the blood vessels of the spleen pass.

*Department of Surgery, New York Homeopathic Medical College and Flower Hospital, Symposium on Surgery of the Spleen, under direction of Joseph H. Fobes, M. D., F. A. C. S., Assistant Professor.

Further development of the substance of the spleen consists of the breaking up of the cellular mesenchymal tissue by blood vessels and the formation of splenic corpuscles. The connective tissue trabeculæ, as well as the capsule of the spleen, are derived from the original mesenchymal tissue. Blood vessels become dilated in parts of their course to form the cavernous vessels which are separated by the pulp ends. Connective tissue of the pulp cords is a derivation of the mesenchyme, but the origin of the various type of cells in the cords is not certain. The adventitia of the walls of some small arteries become infiltrated with lymphocytes to form the splenic corpuscles.

The spleen is a blood forming organ, in which leukocytes and, in embryonic life as well as, under certain conditions, in adult life, erythrocytes are formed.

It is situated under the cover of the lower ribs, in the posterior portion of the left hypochondriac region, being separated from the ribs by the diaphragm, and above by a small portion of lower margin of left pleura and lung, so that its position corresponds to the 9, 10, 11th ribs. Its upper and inner extremity extends into the epigastric region, being distant about $1\frac{1}{2}$ inches from median plane of the body, while its outer end reaches almost to the mid axillary line. It is obliquely placed between fundus of stomach and diaphragm, its obliquity runs first from above downward and outward and also from above downward and forward, following the direction of the 10th rib.

It is the largest of the so-called "Ductless Glands" and varies greatly in size, its average length being about 5", width about 3" and its thickness about 1 to $1\frac{1}{4}$ ", and weighs about $6\frac{1}{2}$ oz. Furthermore, the size of the spleen is increased during and after digestion and varies considerably according to state of nutrition of the body, being large in well fed, and small in starved animals.

The spleen is normally movable within certain narrow limits. It moves with respiration and also with the stomach movement. It is supported by ligaments which are folds; the gastro-splenic omentum which is a fold of peritoneum connecting the margins of the hilum of the spleen to the stomach, the lieno-renal ligament which is derived from the layers of peritoneum forming the greater and lesser sacs when they come in contact between left kidney and spleen. It is also held in place by the phrenocolic liga-

ment. The spleen is of an oblong, flattened, tetrahedral form, soft, of very friable consistency, highly vascular and of a dark purplish color.

It has four surfaces, upper and lower ends, and three borders.

The external or phrenic surface is convex, smooth, and is directed upward, backward and to the left. It is in relation with the under surface of the diaphragm, which separates it from 9, 10, 11th ribs of the left side, and the intervening lower border of the left lung and spleen. The internal surface is concave, and is divided by a ridge into an anterior or gastric, and a posterior or renal portion. The anterior or gastric, which is directed forward and inward, is broad and concave, being in contact with the fundus of the stomach, and below this with the tail of the pancreas. It presents, near its inner border, a long fissure, called the hilum, in which are several irregular openings for the entrance and exit of vessels and nerves. The posterior or renal surface is directed inward and downward. It is somewhat flattened, considerably narrower than the gastric surface, and is in relation with the upper part of the outer surface of the left kidney and occasionally with the left suprarenal gland.

The upper end of the spleen is directed inward toward the vertebral column, where it lies on a level with 11th thoracic vertebra within $1\frac{1}{2}$ -2" of the midline. The lower end, sometimes called the basal surface, is flat, triangular in shape and rests upon the splenic flexure of the colon and the phrenocolic ligament and is generally in contact with tail of pancreas.

The anterior border is free, sharp, and thin, and is often notched, especially below. It separates the phrenic surface from the gastric surface. The posterior border, more rounded and blunter than the anterior, separates the renal from the phrenic surface; it corresponds to lower border of 11th rib and lies between diaphragm and left kidney. The internal border or intermediate margin is the ridge which separates the renal and gastric portions of the internal surface.

The spleen, with the exception of its hilum, is completely invested in peritoneum, which is firmly adherent to the capsule of the organ. The capsule of the spleen consists of connective tissue, elastic fibers and nonstriated muscle cells. This capsule sends numerous processes or trabeculæ into the interior of the

organ, which branch and form a frame work in which the vessels, especially the veins, are embedded.

On examining a section of the spleen with the low-power magnifying glass, sections of the trabeculæ, round or oval masses of cells, similar in structure and appearance to the lymph nodule, called Malphigian corpuscles, are clearly defined. Between and around these structures is a tissue rich in cells, blood vessels and blood-corpuscles, known as the spleen pulp. The Malphigian corpuscles or bodies are not very plentifully represented in man, and they are, with their germ centers, the formative centers for the lymphocytes.

F. P. Mall, whose contributions on the structure of the spleen have greatly extended the knowledge of the microscopic anatomy of this organ, states that the trabecular and vascular systems together outline masses of spleen pulp, which he has named spleen lobules. Each lobule is bounded by three main inter-lobular trabeculæ, each of which sends three intra-lobular trabeculæ into the lobule communicating with each other in such a manner as to divide the lobule into about ten smaller compartments. An artery enters at one end of the lobule and passing up through its center gives off a branch to the spleen pulp found in each of the ten compartments formed by the intra-lobular trabeculæ. The spleen pulp in these compartments is arranged in form of columns or cords called *Pulp cords*. The branches of the main intra-lobular artery going to each compartments divide repeatedly; the terminal branches course in the spleen-pulp cord and in their path, give off numerous small side branches, which end in small expansions known as the *Ampullæ of Thomas*. These are divided into three parts, the first part, the ampulla proper, is lined by spindle shaped cells, directly continuous with the endothelial cells of the artery, the 2d third, which often communicates with neighboring ampulla, contains large side openings, while the remaining third is difficult to demonstrate. The circulation through spleen is therefore not a closed one, through a system of capillaries completely closed, but rather through spaces in the spleen pulp certain of which are more direct, leading from the terminal arteries to the veins.

Therefore, the spleen has a very typical blood supply. The splenic artery, which is a branch of coeliac axis, enters the hilum

and divides into branches that follow the trabeculæ. Of these, some quickly pass to the pulp, while others follow the trabeculæ to their smallest divisions, that is, to the ampullæ of Thomas. These ampullæ are porous and continue as veins, that collect the blood and empty it into the splenic vein at the hilum.

The lymphatics originate in two ways, each from the sheath of the arteries and in the trabeculæ. The former trunks are the flap collecting trunks, and accompany the blood vessels, the latter pass to the superficial lymphatic plexus, which may be seen on the surface of the organ. Lymphatic channels do not exist in the pulp. The deep trunks at the hilum number from 1-10 and terminate in the splenic node. The superficial trunks also pass to the hilum and terminate in the splenic nodes. The nerves are derived from the splenic plexus, which is a part of or connected with the solar plexus. Nerves enter the spleen with the vessels.

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The invisible disease-producing change in the inward man and the complex of outwardly perceptible symptoms are consequently determined by one another reciprocally and inevitably; both together make up the disease in its entirety, that is, constitute such a unity that the latter must stand or fall simultaneously with the former, that they must exist together and disappear together, so that whatsoever is able to call out a group of definite symptoms, must have caused in the body that corresponding inward morbid change which is inseparable from the outward appearances of disease. Otherwise the appearance of the symptoms would be impossible: and similarly whatever removes permanently the complex of outward signs of disease must simultaneously have removed the inward morbid change, because the banishing of the former without the disappearance of the latter is inconceivable.—*Organon of the Rational Art of Healing.*

The Physiology of the Spleen*

BY

ADOLPH S. KRAMER, PH. G., B. S., CLASS OF 1917.

THE importance of the functions of the spleen have not been given until recent years their due attention. The spleen is the largest ductless gland in the human body, and as other similar glands, it has undoubtedly a multiple function. However, literature on physiology in general, and our text books especially, have until lately concerned themselves mostly with the more obvious and easily detectable functions of this organ, and have seemingly entirely neglected the more obscure and complicated ones, the latter being most probably due to the internal secretion possessed by the spleen.

It is accepted that the spleen, like the lymph nodes, is engaged in the formation of white blood cells, this being well confirmed, first, by the fact, that there is an increase in the white count, after passing a current over the area enclosed by the surface marking of the spleen, and, second, by the fact that the splenic vein contains a larger amount of white blood cells than the splenic artery.

The spleen also acts as a filter for the blood, retaining debris, and different particles found in the blood that would be injurious to health, if not removed.

It is also well established that the spleen, during intrauterine development, is concerned in the production of red blood cells, as during that period the spleen contains many red blood cells in different stages of development.

Again, the presence of a large amount of products of destruction of red blood cells in the spleen, and the considerably smaller amount of red blood corpuscles in the splenic vein, than in the splenic artery, proves the long held view that the spleen breaks down the red blood cells, which have discharged their office and are worn out.

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Besides these obvious functions, the spleen undoubtedly has an internal secretion, the functions of which are quite numerous and complicated, hence more or less difficult to determine.

In this paper I will endeavor to abstract the most important work done by different investigators in this field, and also add some of my own observations, which though amounting to very little, as compared with the tremendous work done by many scientists, yet may be of some value.

The four methods to study the functions of an organ, having an internal secretion, are to note the changes taking place during:

- (A) Diseased condition of the organ.
- (B) Extirpation of the organ.
- (C) Transplantation of the organ after extirpation.
- (D) Injection of the extract of that organ.

Of these the second and fourth are of importance, as far as the study of the functions of the spleen is concerned, since diseases of the spleen are almost exclusively secondary, thus eliminating the first method and, as a short time after removing the spleen, other glands, especially the lymph nodes, take up the most important functions of this organ, transplantation does not seem to have a noticeable effect.

The fact that splenectomy is not incompatible with maintenance of life led some physiologists to doubt that the spleen had an internal secretion, but the numerous investigations recently conducted by many great physiologists prove it beyond any doubt.

The functions of the spleen attributed to its internal secretion may be grouped into three general classes:

- (A) Those affecting the gastro-intestinal tract.
- (B) Those influencing the general resistance of the individual.
- (C) Those affecting the composition of the blood.

To the first group belong the experiments of:

(1) Richet,¹ who, after a series of experiments, concludes that the spleen by mechanism not well explained, facilitates the absorption and assimilation of food. He splenectomized nine dogs and made careful comparative observations, with nine other dogs, as similar as possible in age, sex and disposition. The

result showed that the splenectomized animals ate more, but gained in weight less than the normal ones, though before splenectomy they gained about the same amount as the other animals, and he concluded that the spleen plays an important role in the assimilation and digestion of food.

(2) Bellamy's² observations of human beings, who were splenectomized on account of different blood diseases, corroborated Richet's assumption and partly explains it. He found that the pancreatic digestion in such people is almost invariably lost, and that most of the intestinal digestion is carried on by the succus entericus lower down, thus reducing the area of absorption and limiting the amount of digestion.

(3) Herzen³ proved, experimentally, what was afterwards duplicated by Bellamy—that the spleen, by an internal secretion, carried through the blood to the pancreas activates the trypsinogen into trypsin, but this, while mostly performed by the spleen, is not limited to the latter, as the jejunal mucosa, especially the lower half, furnishes a similar activator.

(4) Luciani,⁴ of the University of Rome, proved, experimentally, the influence of the spleen on gastric digestion. After removing the spleen he found the digestive power of the gastric juice slowly but constantly weakening, and after administering, by mouth, an infusion of congested spleen, eight hours before a test meal, the digestive power was again raised for one to two days.

(5) Retger and Mandel⁵ proved that an injection into the circulation of the splenectomized dog of an aqueous solution of splenic extract increased the secretion of trypsin from the pancreas.

(6) Prof. Ott⁶ observed that the peristaltic movement of the gastro-intestinal tract was considerably impaired in splenectomized animals, and that same was restored to normal after injection of splenic extract.

To the second group belong the experiments of:

(1) Dr. R. C. Carpenter,⁷ who, concluding from the fact that the spleen becomes greatly enlarged during acute infectious diseases, that it is a source of a protective substance, gave to his typhoid fever patients splenic extract (five grains, three times a day) in order to restore the functions of that organ, which is

greatly disordered in typhoid, and, according to his clinical records, the temperature of the patients so treated was considerably reduced and was followed by a general amelioration of symptoms.

(2) Sajous⁸ explains the great protective value of the spleen in the following manner: The power of the leucocytes to destroy micro-organisms depends upon the presence of trypsin in them. This trypsin is supplied by the pancreas in the form of the inactive trypsinogen, and is activated by a substance secreted by the spleen, thus enabling the leucocytes to digest the pathogenic micro-organisms, hence increasing the individual's resistance.

(3) Dr. Boyle,¹⁴ of Conner, treated a number of tubercular patients with a specially prepared splenic extract, and in his communication to The International Congress of Tuberculosis, at Rome, in 1912, claimed wonderful results, as not only does it increase the number and efficiency of the phagocytes, but it also stimulates the individual cells to combat the Koch bacillus. In one hundred and forty-six cases, out of the hundred and fifty so treated by him, there was an unquestionable rapid effect of the treatment, and out of those that received a prolonged treatment seventy-five per cent. were absolutely cured. The preparation used by Boyle is an extract of the pig's spleen, known as Colloidogenine. According to Boyle, one of the functions of the internal secretion of the spleen is to keep the principal mineral salts in the blood in the colloidal form, as according to him only colloids are suitable for cellular appropriation, while crystalloids are waste and are eliminated by the kidneys. Boyle proved this theory by greatly reducing excessive elimination of phosphates in urine with one or two doses of his splenic extract.

Besides keeping the salts in a form easily appropriated by the cells, thus enabling them to resist the action of the tubercle bacillus, the splenic extract seems to greatly stimulate the growth of connective tissue around tubercular lesions, thus walling them off from the surrounding tissue. Two similar guinea pigs were inoculated with tuberculosis, one was treated with splenic extract, and the other not. The former survived, and nine months later, when killed, showed, on autopsy, that all tubercular lesions were completely overgrown with connective tissue, while the

second guinea pig, not treated with splenic extract, died three months after inoculation, and on autopsy showed no tendency to fibrosis.

To the third group belong the investigations of:

(1) Pugliese,⁹ of Milan, who proved by series of experiments the role the spleen plays in keeping up the normal amount of pigments in the blood and bile. He investigated the secretion of bile in the same animal before and after splenectomy. The volume of the bile was increased, but the total output of iron was decreased, while the amount of iron in the feces was considerably increased. He also demonstrated a diminution of iron in the blood, and along with it a decrease of red blood cells. This is only true of the early period of the removal of the spleen, the blood soon returning to normal, if the animal is fed on an iron rich diet (much meat).

(2) Asher,¹⁰ of Berne, by comparative observation of a splenectomized and a normal dog, found that the former excreted more iron in the feces with same diet. He also found that while the normal dog did not show any signs of anemia after a prolonged iron free diet, the splenectomized dog showed marked anemia under same conditions.

Bayer,¹¹ having observed splenectomized people, found same to be true of human beings, hence we can justly infer that the spleen in some way or other enables the body to maintain ingested iron.

(3) Donilesky¹² and Selensky, as far back as 1895, proved, experimentally, that when the extract of spleen is administered hypodermically, it considerably raises the hæmoglobin contents (7-40 per cent.), as well as the number of red blood cells.

(4) Simon's¹³ and Spillman's experimental findings show that an injection of .2 gram of freshly prepared splenic extract caused an increase of red cells from 2,980,000 to 6,810,000, while the white count, at the same time, was raised from 9,400 to 12,800.

(5) Boyle,¹⁴ after injecting 5 c.c. of his extract in a tubercular patient with a red count of 3,800,000, increased same to 5,000,000 in twenty-four hours, and after a second injection, twenty-four hours later, to 6,000,000.

(6) Dr. David,¹⁵ using splenic extract in anemia, found that

not only the blood findings were changed, but the appetite was improved and there was a considerable increase in weight, as well as general health of the patient.

Dr. Carnot explains the increase of the red cells by the fact that the splenic extract stimulates the red bone marrow in same manner as the thyroid extracts stimulate the activity of the ovary, that is, the spleen has a synergic action.

These experiments constitute only a small number of those recorded in medical and physiological literature, but are sufficient to show the importance of the spleen and usefulness of its extract in different pathological conditions.

As mentioned before, I myself have conducted a few experiments and will here give the results of one of them in detail.

The fifth of November, 1915, I procured a dog and kept him under my observation for one month, feeding him on the following diet:

Per twenty-four hours: Meat, one-half pound; bread, one-half pound; water, one pint.

He gained, the first week, one and one-half pounds, then from three-quarters to one pound per week. At the end of the month I took his blood count, with the following result:

R. B. C. 5,000,000, of which only a few were nucleated.

W. B. C. 8,200.

Blood platelets, few.

I then removed the spleen, observing at the same time his musculature and the amount of fat in the internal organs. The former being well developed, and the latter being more or less scanty. After the operation I fed him for a week on a liquid diet, consisting of milk mostly. During this week he lost three and one-half pounds. At the end of the first week his temperature and general behavior became normal. I then started to feed him on the same diet as before the splenectomy, but he became very restless. I attributed his restlessness to hunger, and increased his meat ration to one pound per day. At the end of the second week he gained four ounces. During the third week he lost two ounces, and during the fourth week he gained seven ounces, but his muscles became flabby. During the fifth week he gained only two ounces, his muscles becoming more flabby than before. I then mixed with his food splenic extract (ten

grs., three times per day) and cut down his meat ration to three-quarters of a pound. He began to regain his weight the first week, four ounces, and from five to six ounces the succeeding three weeks. Later, when I had eliminated the splenic extract he only gained about one ounce in two weeks. I then made another blood count and found his red to be 3,800,000; but fully half of them were nucleated cells. The white count was 8,900, the differential count showing only a slight change. There was some increase in large mononuclear leucocytes. The great change in the kind of red corpuscles can only be explained by the fact that the bone marrow was not stimulated sufficiently to produce a mature red blood cell.

I then killed the dog and found, on autopsy, that there was great increase in fat, but a decrease in muscle tissue. The internal organs, macroscopically, hardly showed any change except the lymph nodes, which were considerably enlarged. Microscopically the mesenteric lymph glands showed, on section, a great increase in lymphatic tissue. The most interesting microscopic picture was that of the pancreas. It was tremendously granular, the granulation being so pronounced as to completely obscure the cell islands of Langerham. My opinion is, that intense granulation of the pancreas is due to the fact the spleenless dog's pancreas does not discharge so easily, if at all, its trypsinogen, and the granules of trypsinogen are retained which are seen on section.

I intended to perform a number of other experiments, but as the facilities and my time were very limited I had to postpone them till a more favorable occasion.

From the above stated facts you can summarize that the functions of the spleen are:

- (1) Production of R. B. C. during intrauterine development.
- (2) Production of W. B. C.
- (3) Filtration of the blood.
- (4) Destruction of old unfunctionating R. B. C.
- (5) Aids assimilation and utilization of food.
- (6) Activates trypsinogen into trypsin.
- (7) Raises digestive power of gastric juice.
- (8) Stimulates pancreatic secretion.
- (9) Regulates the amount of pigments in blood and bile.

- (10) Aids peristalsis of gastro-intestinal tract.
- (11) Increases general resistance.
- (12) Prevents the decolloidization of salts in the blood, thus retaining them in the blood in a form that they can be appropriated for cellular activity.
- (13) Stimulates the production of C. T., especially around lesions.
- (14) Raises hemoglobin contents in the blood.
- (15) Stimulates red bone marrow to produce R. B. C.

The last two increase the oxygen carrying power of the blood, thus increasing oxidation of deleterious products.

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Injuries and Ruptures of the Spleen*

BY

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FROM the surgical standpoint this organ receives, probably, the least amount of attention of all the abdominal viscera, yet there are few emergencies of more serious import in abdominal surgery than the hemorrhage from a lacerated or ruptured spleen.

Etiology.—While these conditions, namely, lacerations and ruptures of the spleen are not common, neither are they rare, but since they are of such serious nature in themselves and because they are usually complicated with other abdominal injuries they merit careful consideration. A diseased spleen or a congestion of the spleen, as occurs in all acute infectious diseases, is predisposed to these accidents. Perhaps the most frequent causes of injuries to the spleen are stab wounds and these are usually multiple, the injury to the spleen occurring through the thorax rather than through the abdomen in most cases. Stassoff¹ reports nine such cases. In these cases there is always an associated diaphragmatic and pleural wound of variable extent. Again, we may have injuries of the spleen occurring through the abdomen, as in the case of a gunshot wound. Compression of

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the abdomen may cause splenic lacerations or rupture and such compression may occur by the passing of a wagon wheel over the abdomen, Chanier and Bardon² having reported such a case.

Perhaps the rarest type of these cases is the spontaneous rupture of a tubercular spleen, a case of which has been reported by J. E. Cannaday.³ Still another rare case of this type is the rupture of an enlarged spleen during an epileptic fit, a fatal case of which has been reported by L. Norrlin.⁴

Lastly, fatal ruptures have also occurred during coughing and straining spells or from falls or blows upon the abdomen.

Anatomy in Brief.—The spleen measures $5 \times 3 \times 1\frac{1}{2}$ and weighs about seven ounces, hence it is quite a large viscus.

It lies deep in the left hypochondrium, under the 9-10-11th ribs, and is connected with the stomach by the gastro-splenic omentum, with the diaphragm by a suspensory ligament and with the left kidney by the lienorenal ligament, all of which are folds of peritoneum. It is covered by a fibro-elastic capsule from which septa radiate into its substance forming its stroma. It is supplied by the splenic artery, a large vessel which divides into five or six branches as it enters the hilum.

Lesions.—The gross lesions found in these cases are quite varied, but the result is about the same in all cases, namely, that of severe internal hemorrhage.

We may find single or multiple partial ruptures of the capsule and medulla. We may find a spleen more or less completely broken into two or more pieces. Again we may find the external capsule alone ruptured. Cases have been reported in which the spleen itself has been injured without rupture of its capsule, but followed by a secondary hematoma and rupture. Other varieties of splenic injury are seen in those cases where the spleen is severed from its pedicle or has been reduced to a pulp within its capsule.

Complications.—With injuries of the spleen there is generally more or less involvement of the adjacent viscera giving rise to varied surgical emergencies of grave import. Isolated wounds of the spleen are only apt to occur in normal spleens when the diaphragm is fixed in deep inspiration at the moment of the injury. In stab wounds the pleura and diaphragm usually show variable injuries. In cases of bullet wounds the stomach may be involved.

Norrlin⁴ reports a series of cases of rupture of the spleen among which are the following complications. Each of the cases here mentioned is designated by its complication:

A case associated with injury to the liver and ventricles.

A case associated with injury to the diaphragm.

A case associated with injury to the small and large intestines.

A case associated with injury to the splenic vein.

A case associated with injury to the lungs and fracture of the ribs.

Four cases associated with injury to fracture of the ribs.

Prognosis.—The prognosis is uncertain in all cases, the more so since the extent of injury is so variable and complications are the rule. In those cases where the splenic injury is accompanied by injuries of the diaphragm and pleura only, the prognosis is fairly good, if operated immediately, the mortality being about eighteen per cent.

In the rare cases of rupture due to a primary tubercular lesion the prognosis is poor since the condition is rarely diagnosed early enough to obtain good operative results and secondary tubercular lesions of some other viscus is apt to ensue.

Lastly, in all these cases complicated by injuries of other abdominal viscera the prognosis is necessarily more grave.

Symptomatology.—The complications in these cases render the symptom complex unsatisfactory for diagnostic purposes so that an exploratory laparotomy is necessary. The most important symptoms are those of internal hemorrhage, namely, rapid thready pulse, subnormal temperature, cold clammy sweat, great thirst, blanched lips, dilated pupils, dyspnea, etc. The abdomen is apt to be rigid and tender. Pain throughout the affected side, and in some cases violent pain is felt in the left scapular region, this latter being known as Kehr's sign. Signs of trauma are generally present, but still cases occur which show no outward signs at all. Most cases give a marked percussion dullness, which is generally unilaterally left. This is explained by the coagulation of the extravasated blood in the left flank and is more or less characteristic of hemorrhages of the spleen.

Treatment.—Immediate operative procedure is always indicated, care being taken to maintain the body temperature by external applications and aggressive measures used to combat shock—the latter are too well known to be mentioned here.

The procedures most often adopted are partial or complete splenectomy and splenorrhaphy; probably complete splenectomy is the most frequent used of these.

W. J. Mayo⁵ says "that safety in splenectomy depends on the careful separation of the attachments of the spleen and the delivery of the organ without injury to its vascular pedicle." He gives the following technic for the operation. Make a longitudinal incision through the upper half of the left rectus muscle—this part of the incision may be carried downward to any desired extent. From the upper end of the first incision an oblique incision is made along the costal margin and about an inch and a half from it which is carried up toward the ensiform. Vascular adhesions, especially near the upper pole of the spleen, are apt to be encountered; carefully separate them with the fingers, as close to the spleen as possible. Occasionally such adhesions are very resistant and require cutting for their separation. The bulk of the vascular supply is in the gastro-splenic ligament, which can be delivered with the spleen, the stomach being partly withdrawn from the abdomen before the gastro-splenic ligament and vessels are separated.

In cases of large adherent spleens there may be deep vascular connections with vessels running along the spine and crux of the diaphragm; these, of course, must be separated before the spleen can be removed. In such a case the hemorrhage is controlled by carefully adjusted gauze tampons, since the bleeding points cannot be seen before the removal of the spleen. When the tail of the pancreas is involved it is separated and its bleeding points are ligated. Now the vascular pedicle is cleared and ligature applied by the two forceps method, arteries being taken first. W. J. Mayo⁵ reports five deaths in fifty-six such cases and two of the five fatal cases were septic.

Stasoff recommends splenorrhaphy for these cases. In this operation the splenic laceration is sutured with catgut and the line of sutures is overlaid with omentum. He warns against tamponade for the reasons that it is impossible to completely close the wound, because of the liability to infection of the fistula and because of the tendency to secondary hemorrhage.

In partial splenectomy only the injured part is removed and the edges of the residue brought together with sutures.